REMARKS/ARGUMENTS

Favorable reconsideration of this application is requested in view of the above amendments and in light of the following remarks and discussion.

Claims 1-16, 21-27 and 29-35 are pending. Claims 18 and 28 were canceled previously. Claims 17, 19, and 20 are canceled by the present amendment. Claims 29-33 are withdrawn. No claims are amended. No new matter is added.

In the outstanding Office Action, Claims 21-23, 25, and 27 were rejected under 35 U.S.C. § 102(b) as anticipated by Watanabe et al. (Japanese Patent No. 06204143, herein "Watanabe"). Claims 1-5, 8-16, 34, and 35 were rejected under 35 U.S.C. § 103(a) as obvious over Watanabe in view of Moslehi (U.S. Patent No. 5,846,883, herein "Moslehi"). Claims 17-20 and 26 were rejected under 35 U.S.C. § 103(a) as obvious over Watanabe in view of Tanaka et al. (U.S. Patent Pub. 2004/0020599, herein "Tanaka"). Claim 24 was rejected under 35 U.S.C. § 103(a) as obvious over Watanabe. Claims 6 and 7 were rejected under 35 U.S.C. § 103(a) as obvious over Watanabe, Moslehi, and Kawada et al. (U.S. Patent No. 5,536,395, herein "Kawada").

Regarding the rejection of Claims 1-5, 8-16, 34, and 35 as obvious over Watanabe in view of Moslehi, that rejection is respectfully traversed by the present response.

Applicants wishes to direct the Examiner's attention to basic requirement of a *prima facie* case of obviousness as set forth in the MPEP § 2143. This section states that to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the references teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

By way of review, the shower head structure and the semiconductor processing device in accordance with the invention recited in independent Claims 1 and 10 includes a shower head and a plurality of gas injection holes for providing the processing gas. They also include **at least one light introducing rod of a radiation thermometer inserted through at least one of the gas injection holes**. The above-noted features are supported in the specification on page 16, line 7 to page 17, line 11; page 18, line 8 to page 19, line 10; and Figs. 1-4 of the specification.

One benefit of the invention recited in independent Claims 1 and 10 is that by inserting the light introducing rod through the gas injection hole of the shower head, a film can be prevented from adhering to the light introducing rod by the gas injected from said one of the gas injection holes, accordingly, the wafer temperature can be detected accurately. However, both Watanabe and Moslehi fails to teach or suggest the above-noted benefit of inserting the light introducing rod through the gas injection hole of the shower head. See, for example, page 19, line 23-24 in the specification.

Claims 34 and 35 recite that the processing gas is provided into the processing space through each of said at least one of the gas injection holes.

The outstanding Office Action asserts that Watanabe discloses a shower head including a plurality of gas injection holes and a radiation thermometer, and Moslehi discloses an optical plug (604) inserted through a shower head.[1]

However, in both Watanabe and Moslehi, there is no teaching or suggestion that would be preferable **to insert the light introducing rod through the gas injection hole of**

[1] Outstanding Office Action, pages 6 and 13-14.

the shower head. No proper combination of Watanabe and Moslehi would provide the above-noted benefit of Claims 1 and 10 inasmuch as neither of Watanabe and Moslehi is concerned with providing gas flow over the surface of a light introducing rod.

The light introducing rod of a radiation thermometer inserted through at least one of the gas injection holes produces an effect that is more than the sum of its parts, and the mere description of an optical plug (604) in Moslehi and the simple disclosure of a showerhead with gas injection holes in Watanabe does not render the above-noted feature obvious.

Applicants respectfully submit that it would not have been obvious to one of ordinary skill in the art, at the time the inventions recited in Claims 1 and 10 were made, to insert the light introducing rod of a radiation thermometer through the gas injection hole of the shower head. Thus, it is respectfully submitted that independent Claims 1 and 10 patentably distinguish over any proper combination of the cited references.

Claims 2-5, 8, 9, 11-16, 34, and 35 each depend from one of independent Claims 1 and 10 and patentably distinguish over any proper combination of Watanabe and Moslehi for at least the same reasons as Claims 1 and 10 do.

Applicants wish to make the following additional remarks regarding dependent Claims 4, 5, and 13.

Claims 4 and 13 recite that a gas is discharged from a lower end opening of **said one of the gas injection holes** to be diffused while the gas is falling toward the outside of a susceptor in the processing space; and said at least one of the gas injection holes is spaced apart from a center of the shower head. The spacing is such that a position of a main gas stream of the gas discharged from said at least one of the gas injection holes falls outside an outer circumference of the substrate on the susceptor when the gas stream reaches an identical horizontal level to that of an upper surface of the susceptor. The above-noted features are supported in the specification on page 50, line 18 to page 51, line 8; and Fig. 20.

One benefit of this feature is the reduction of local thinning of a film from occurring on the surface of the wafer (see page 51, line 22-25).

The features recited in Claims 4 and 13 determining the **position** of the gas injection **holes through which the light introducing rod is inserted** are not disclosed by Watanabe and Moslehi. Watanabe and Moslehi does not teach or suggest that a position of a main gas stream of the gas discharged from the gas injection holes falls outside an outer circumference of the substrate on the susceptor when the gas stream reaches an identical horizontal level to that of an upper surface of the susceptor. Rather, the optical sensor part (604), described in Moslehi and relied on in the outstanding Office Action for light introducing rod, is located directly above the **center** of the wafer.

Therefore it is respectfully submitted that the rejection of Claims 4 and 13 should be withdrawn for the additional reasons discussed above.

Dependent Claim 5 recites that the opening area of a gas injection hole through which each of said at least one light introducing rod is inserted is larger than an opening area of a gas injection hole through which no light introducing rod is inserted by a cross sectional area of said at least one light introducing rod, an identical gas being injected through the gas injection hole and said another gas injection hole. The above-noted feature is supported on page 24, line 10-18 of the specification. One benefit of this feature is the improvement of the intra-surface uniformity of the film thickness (see page 24, line 15-18).

Both Watanabe and Moslehi are silent regarding the feature that the opening area of a gas injection hole through which the light introducing rod is inserted is larger than an opening area of another gas injection hole by a cross sectional area of the light introducing rod.

The limitation of Claim 5 has a beneficial effect of improving the intra-surface uniformity of the film thickness, and would not have been obvious to one of ordinary skill in

the art at the time the invention was made to modify Watanabe or Moslehi to include the features recited in Claim 5.

Therefore it is respectfully submitted that the rejection of Claim 5 should be withdrawn.

Regarding the rejection of Claims 21-23, 25, and 27 as anticipated by Watanabe, that rejection is respectfully traversed by the present response.

Independent Claim 21 is directed to a semiconductor processing device including a shower head, **a heat ray introducing passage**, a radiation thermometer, and a gas introducing passage. The shower head provides the processing gas through a space formed therein. **The heat ray introducing passage is vertically formed through the shower head and separated from the space formed inside the shower head. The gas introducing passage is connected to the heat ray introducing passage to introduce a gas thereinto, and separated from the space formed inside the shower head.**

Examples of the above-noted features are described on page 16, line 26 to page 17, line 2; and page 40, line 3 to page 42, line 26. One benefit of the above-noted features is the reduction or prevention of formation, on an inner surface of the measurement window (116), of an unwanted film that can disturb the temperature measurement (see page 41, line 15-22 and page 42, line 20-25).

The outstanding Office Action states that the "volume inside 6" of Watanabe corresponds to the heat ray introducing passage, the "volume between top and bottom of 14" of Watanabe corresponds to the shower head, and "16/17" of Watanabe corresponds to the gas introducing passage.

However, to one of ordinary skill in the art, a shower head for processing a semiconductor means an assembly including a space for diffusing a processing gas therein, gas inlets and a housing covering the head space. Watanabe describes that two or more gas

inlets (14) facing the front face of the wafer are disposed in the gas supply head (6), and that two or more species of reactant gases are introduced into the gas supply head (6) from gas pipes (16) and (17), and then are mixed therein to thereby be supplied to a wafer (1) ([0010]). According to the specification of Watanabe, the gas supply head (6) of Watanabe corresponds to the recited shower head. For this reason, "volume inside 6" of Watanabe corresponds to the space of shower head of the present invention for diffusing a processing gas therein, and does not corresponds to the heat ray introducing passage of the present invention. Accordingly, Watanabe fails to disclose **a heat ray introducing passage which is separated from the space formed inside the shower head**.

Further, assuming *arguendo* that the "volume inside 6" of Watanabe corresponds to the heat ray introducing passage, the "volume between top and bottom of 14" of Watanabe corresponds to the shower head as asserted in the outstanding Office Action, in accordance with the invention recited in Claim 21, the heat ray introducing passage is separated from the space formed inside the shower head. However, according to Watanabe, the "volume inside 6" is connected to the "volume between top and bottom of 14". Moreover, in accordance with the invention recited in Claim 21, the heat ray introducing passage is vertically formed through the shower head. However, according to Watanabe, "the volume inside 6" of Watanabe is just disposed above the "volume between top and bottom of 14". Namely, a gas introducing passage of Watanabe is not separated from a space formed inside a shower head of Watanabe and is not vertically formed through the shower head of Watanabe.

Therefore, it is respectfully submitted that independent Claim 21 patentably distinguishes over the cited reference for at least the reason discussed above.

Claims 22, 23, 25, and 27 each depend from independent Claim 21 and patentably distinguish over Watanabe for at least the same reasons as independent Claim 21 does.

Claim 22 recites that the gas is discharged from a lower end opening of the heat ray introducing passage to be diffused while the gas is falling toward outside of the susceptor; and the heat ray introducing passage is spaced apart from a center of the shower head such that a position of a main gas stream of the gas discharged therefrom falls outside an outer circumference of the substrate on the susceptor when the gas stream reaches an identical horizontal level to that of an upper surface of the susceptor.

The outstanding Office Action asserts that the volume inside (6) of Watanabe corresponds to the heat ray introducing passage, and volume between top and bottom of (14) of Watanabe corresponds to the shower head.

However, according to Watanabe, the volume inside (6) is connected to a center portion of the volume between top and bottom of (14), and is not spaced apart from a center of the volume between top and bottom of (14). In other words, the volume inside (6) is spread over the entire surface of the showerhead, including the center of the showerhead. Thus, Watanabe fails to disclose the heat ray introducing passage spaced apart from a center of the shower head.

Further, Watanabe and Moslehi does not teach or suggest that a position of a main gas stream of the gas discharged from the gas injection holes falls outside an outer circumference of the substrate on the susceptor when the gas stream reaches an identical horizontal level to that of an upper surface of the susceptor as recited in dependent Claim 22. Therefore it is respectfully submitted that the rejection of Claim 22 should be withdrawn.

Regarding the rejection of Claims 17, 18, 19, 20, and 26 as obvious over Watanabe in view of Tanaka, that rejection is respectfully traversed by the present response.

Claims 17-20 are canceled. Accordingly, Applicants respectfully submit that the rejection of these claims is negated. Regarding the rejection of Claim 26 as obvious over Watanabe in view of Tanaka, Claim 26 depends from independent Claim 21 and patentably

distinguishes over Watanabe for at least the same reasons as discussed above regarding independent Claim 21.

The outstanding Office Action relies on Tanaka for the feature of an isolation ring.[2]

Tanaka fails to remedy the deficiencies discussed above regarding Watanabe and independent Claim 21. Rather, Tanaka does not teach or suggest a heat ray introducing passage vertically formed through the shower head and separated from the space formed inside the shower head as recited in independent Claim 1. Accordingly, Applicants respectfully submit that dependent Claim 26 patentably distinguishes over any proper combination of Watanabe and Tanaka for at least the reasons discussed above.

Regarding the rejection of Claim 24 as obvious over Watanabe, Applicants respectfully submit that Claim 24 depends from independent Claim 21 and patentably distinguishes over Watanabe for at least the same reasons as independent Claim 21 does.

Regarding the rejection of Claims 6 and 7 as obvious over Watanabe in view of Moslehi and Kawada, that rejection is respectfully traversed by the present response.

Claims 6 and 7 depend from independent Claim 1 and patentably distinguish over any proper combination of Watanabe and Moslehi for at least the same reasons as independent Claim 1 does.

Kawada fails to remedy the deficiencies discussed above regarding Moslehi. The outstanding Office Action asserts that Kawada teaches a retractable radiation transmission rod.[3] However, Kawada does not teach or suggest a light introducing rod for a thermometer inserted through at least one of a plurality of gas injection holes in a shower head. Accordingly, no proper combination of Watanabe, Moslehi, and Kawada would include all of the features recited in either of dependent Claims 6 and 7.

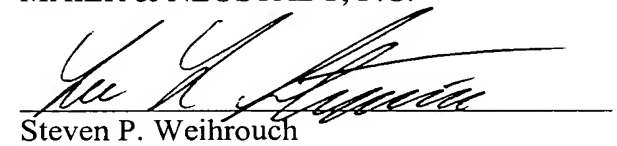
[2] Outstanding Office Action, pages 16-17.
[3] Outstanding Office Action, page 19.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for Claims 1-16, 21-27 and 29-35 is earnestly solicited.

Should Examiner Zervigon deem that any further action is necessary to place this application in even better form for allowance, he is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Steven P. Weihrouch
Attorney of Record
Registration No. 32,829

Lee L. Stepina
Registration No. 56,837

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

I:\ATTY\LS\25s\258108US\258108US-AM-DUE-1-10-08.DOC